PM-48

Programmable Imaging DSP

The ultimate in image processing performance

- A member of the only DSP family specifically designed for imaging applications in digital office equipment
- Unsurpassed image processing power—the equivalent of up to 3.6 billion RISC instructions per second
- Programmable DSP Architecture for flexibility and shorter time-to-market
- Ideal choice for today's high-performance color and grayscale MFPs

The PM-48™ iDSP family member is a high-speed, programmable digital signal processor (DSP) specifically designed for image processing in high-performance multifunction peripherals (MFPs), printers, scanners, and digital copiers. The PM-48 offers image processing performance unmatched by any other DSP available. The PM-48's programmable algorithms make systems easier, faster and less costly to develop than either FPGA or ASIC-based designs.

EXCEPTIONAL PERFORMANCE

A single PM-48 has the image processing power equivalent to 10 Pentium P200 processors. Based on a single instruction, multiple data path (SIMD) architecture, the PM-48 architecture is optimized for image processing. It contains eight Pixel Processors, or data-paths, that operate in parallel. Each data path can execute simultaneous extraction, multiplication, ALU operation, and insertion in a single clock cycle. The eight parallel data paths provide the equivalent of 3.6 billion RISC instructions per second for imaging applications.

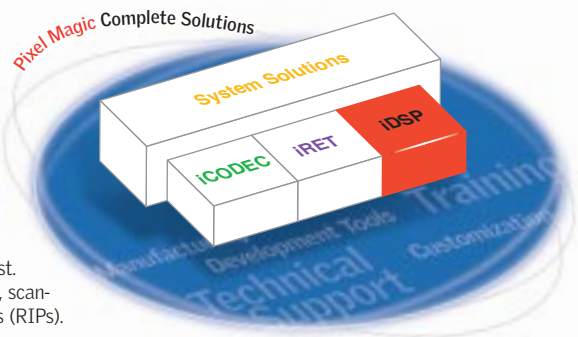
DOWNLOADABLE CODE

The PM-48 implements sophisticated image processing functions in highly efficient instructions. This flexibility enables OEMs to bring their products to market faster and with less expense than with fixed-function ASICs.

Pixel Magic provides an expanding library of downloadable code for standard image-processing functions, such as scanner correction, color conversion, filtering, scaling, block rotation, halftoning, and many other operations. This code enables a single PM-48 to handle scanner, printer, copier, and fax imaging algorithms, making it ideal for use in digital office equipment.

PM-48 Key Features

- 133 MHz engine processes more than 3.6 billion equivalent RISC instructions per second
- Programmable algorithms via downloadable code
- Phase-Locked Loop (PLL) enables the PM-48 to generate its main internal clock frequency from a lower-frequency signal
- Input and output paths with programmable widths of 8, 16 or 32 bits
- On-board 2KB instruction memory
- High-speed Synchronous 32-bit SRAM interface
- 3.3 Volt supply with TTL-compatible I/O
- Supports Burst DMA and SFIFO interface modes
- Flexible I/O—enables connections to scanner or printer engines, or to PM-2m,™ PM-22,™ and PM-36™ compression chips
- Scalable performance by daisy-chaining multiple PM-48s
- Standard processor interface with programmable width data path (16 or 32 bits)



iDSP

THE PIXEL MAGIC™ iDSP™ FAMILY The PM-48 is part of the Pixel Magic family of high-speed image DSPs. Our industry-leading iDSP products—PM-44+,™ PM-44i™ and PM-48—are the only DSPs designed specifically for imaging applications in digital office equipment. Pixel Magic iDSPs leverage today's most advanced technologies—including programmable operation—to deliver the industry's highest performance characteristics and design flexibility, at the lowest possible cost. Typical color and monochrome applications include: high-speed copiers, fax machines, scanners, printers, multi-function peripherals, digital cameras, and raster image processors (RIPs).

Pixel Magic

www.pixelmagic.com

PM-48 CHIP INTERFACE

On the PM-48, separate DMA processes move data between the local memory and 32-bit-wide FIFOs on the input and output ports without program intervention. The data ports can be configured to interface to many different types of devices, including multiple PM-48's, or PM-2m, PM-22, and PM-36 iCODECs. This enables very high-performance systems with integrated compression and decompression operations. It is also easily interfaced to asynchronous scanner and printer engine interfaces.

DESIGN CONSIDERATIONS

The PM-48 can be easily integrated into a variety of systems. Design features include:

- A simple peripheral interface for use with any standard processor
- Control bus width programmable between 16 and 32 bits (the PM-48 appears to host processor as a set of 32-bit registers and memory locations)
- High Performance I/O modes, including Burst, Video Burst, synchronous FIFO modes
- Input and output ports handle synchronous transfer rates of up to 66 MHz with data path widths of 8, 16 or 32 bits.
- SRAM interface can address up to 4MB of readily available synchronous static RAM devices.

A SUPERIOR ALTERNATIVE

The PM-48 offers important advantages over other chip alternatives:

- Standard DSPs—The PM-48 provides much higher imaging performance and much lower costs than other DSPs.
- FPGAs—The PM-48 offers much lower costs, higher performance, and a simpler code-based development process.
- Custom ASICs—The PM-48 offers the time-to-market and low-cost advantages of an off-the-shelf solution. Its programmable design simplifies algorithm changes, reduces time-to-market by significantly reducing development time, and enables product upgrades and scalable architectures for entire product families.

Part #	Perform. (RISC MIPs)	Data Paths	Operating Frequency	Volts	Package	Memory Type
PM-44+	1200 MIPs	4	85 MHz	5v	160 pin	Ext. SRAM
PM-44i	1800 MIPs	4	133 MHz	3.3v	100 pin	Int. SRAM Ext. SDRAM
PM-48	3600 MIPs	8	133 MHz	3.3v	208 pin	Ext. SRAM

PROGRAMMING TOOLSET

The code utilized by the PM-48 is written in a "C"-like assembler. Pixel Magic provides development tools to enable code customization to meet specific requirements, including:

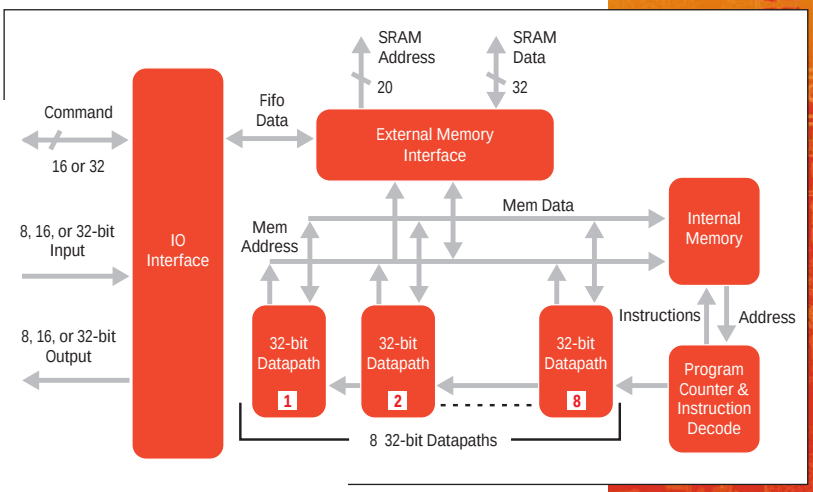
- An Assembler that generates both PM-48 code and commented C code, enabling developers to debug, analyze and tune code with standard C debuggers
- A PCI-based evaluation board enables debugging of user code on a standard PC platform prior to integration with the target system.

Pixel Magic provides training courses to assist developers in writing efficient code for the PM-4x family of programmable iDSPs.

PM-48 SPECIFICATIONS

Electrical Specifications

- 133 MHz clock speed
- 3.3 Volt supply voltage
- 5 Volt tolerant I/O (TTL-compatible I/O)
- Designed and fabricated in 0.35 micron standard cell technology
- Available in industry-standard 208 PQFP package with .50 mm lead spacing



A Subsidiary of Oak Technology

300 Brickstone Square
Andover, MA 01810

(978) 470-8830
Fax: (978)-470 8892

www.pixelmagic.com

ABOUT PIXEL MAGIC Pixel Magic is a world leader in the design, development and manufacturing of advanced compression and image processing solutions for OEMs and Technology Partners in the digital office equipment market. Our systems expertise and industry-leading products are helping drive the performance and capabilities of today's most advanced digital copiers, printers, fax machines, scanners and multi-function peripherals. Our commitment to innovation has made Pixel Magic the partner of choice for some of the most prestigious names in the digital office equipment domain, including Bell & Howell, Canon, DataProducts, Fujitsu, Fuji Xerox, Hewlett-Packard, JetFax, Kodak, Matsushita, Microtek, Minolta, Océ Graphics, Olivetti, Ricoh, Sharp, Toshiba, Xerox, Xionics and Zenographics. Pixel Magic is a subsidiary of Oak Technology, Inc., a leading provider of high-performance semiconductors for optical storage devices, consumer electronics and digital office equipment.

© 1998 Pixel Magic, Inc. Pixel Magic and the Pixel Magic logo are trademarks of Oak Technology. Other products mentioned may be trademarks or registered trademarks of their respective companies. Pixel Magic believes this information sheet is accurate as of its publication date. Pixel Magic is not responsible for any inadvertent errors. This information is subject to change without notice. Printed in USA DS-17-01